

Thunder Board

User's Guide

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Introduction

The Media Vision Thunder Board™ sound card brings high quality sound to your PC games, entertainment, and education software. It includes features like an FM synthesizer, and digital recording and playback. Other features include a built in joystick port and power amplifier. The Thunder Board sound card is fully AdLib* compatible, so you can play all the games that support synthesized music. It is also Sound Blaster* compatible, so you can hear all the digital sound effects and voice recordings used by the hot new games.

The Thunder Board sound card package also includes the Thunder Master* software. This software lets you use the Thunder Board sound card to record, enhance, and play sound files of virtually any length. You can even edit a sound file that is up to 30 seconds in length. Thunder Master's easy-to-use Sound Editor graphically displays your sound files and provides you with all of the accuracy and control needed to do things like cut unwanted sound segments, or create special sound effects.

About the Thunder Board Sound Card

The Thunder Board sound card includes the following features:

- **11 voice FM music synthesizer** - Plays up to 11 simultaneous instrument sounds to deliver an orchestra full of rich and dynamic music. Fully AdLib compatible to support the largest library of games possible.
- **Digitized audio playback capability (up to 22KHz)** - Faithfully plays back and reproduces all kinds of digitized sounds with an 8 bit Digital to Analog Converter (DAC). Works with a number of games that utilize the digital voice channel to deliver ultra-realistic human speech and mind blowing sound effects.

- **Digitized audio recording capability (up to 22KHz)** - Digitizes and records any kind of sound through the microphone input jack.
- **High quality sound** - Dynamically filters for low noise digital recording and playback.
- **Microphone input** - Uses Automatic Gain Control (AGC) to compress sound input to adapt dynamically to different recording conditions.
- **Audio compression** - Compresses and decompresses digitized audio at rates of 2:1, 3:1, and 4:1. Compression turns large sound files into smaller files that can easily be stored and transferred to a floppy disk or even sent over a network.
- **Built in joystick port** - Includes IBM* standard analog joystick port.
- **Built in 2 watt power amplifier** - Includes volume control.

Third Party Software Support

The Thunder Board sound card supports the largest library of third party software. Most third party software packages include music/sound drivers. All you have to do is select the correct music/sound driver when you install the package, or follow the package's instructions for selecting the driver. You may see the Thunder Board sound card driver listed as Thunder Board, Sound Blaster, or AdLib.

System Requirements

To use the Thunder Board sound card, your computer must meet these minimum hardware and software specifications:

- IBM* PC/XT, AT, 386, PS/2 (model 25/30), Tandy* (except 1000 EH/HX), and compatibles.
- 512 Kb RAM
- DOS 2.0 or higher

To use the Thunder Master software, your computer must meet these minimum hardware and software specifications:

- DOS 3.3 or higher
- Microsoft, or 100% compatible, Mouse
- 512 Kb of memory
- EGA/VGA display

About This Manual

This manual describes how to install and use the Thunder Board sound card and accompanying software.

- Chapter 1 tells you how to install the Thunder Board sound card in your IBM PC or compatible computer. It also tells you how to install the accompanying Thunder Master software.
- Chapter 2 tells you how to use the Thunder Master software to record, edit and play sound files.
- Appendix A describes connecting the Thunder Board sound card to the Media Vision Pro AudioSpectrum.

1. Installing the Thunder Board Sound Card

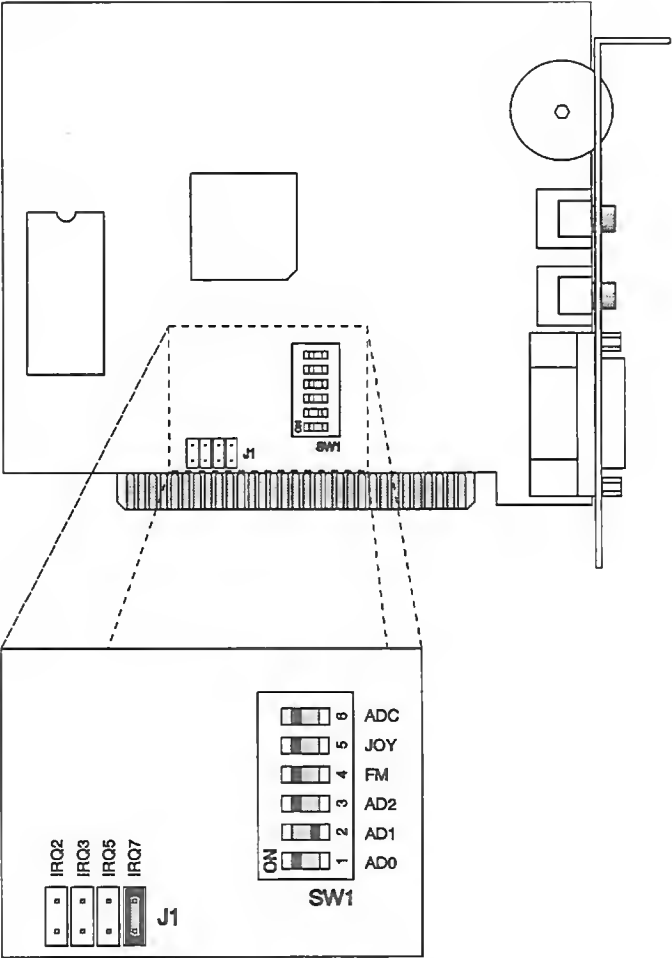
This chapter tells you how to install the Thunder Board sound card in your PC or compatible. Installing the Thunder Board sound card includes, setting an I/O address, setting an audio interrupt, and disabling the joystick port if you decide to use the existing port on your computer. Finally, this chapter tells you how to install the accompanying Thunder Master software.

Setting an I/O address

The Thunder Board sound card requires a range of your computer's I/O port addresses. The board's default address range starts at 220 (hexadecimal). If the default address range conflicts with another device, you can change the range by setting the switches on the SW1 switch block. The table below shows the allowable address ranges, along with the corresponding switch settings. (Within each range, the addresses used are $2n6$, $2n8$, $2n9$, $2nA$, $2nC$, and $2nE$, where n is 1, 2, 3, 4, 5, or 6.) Locate the SW1 switch block in the illustration on the following page.

Port Addresses	Switch Settings		
	AD2	AD1	AD0
\$210 - \$21F	ON	ON	OFF
\$220 - \$22F	ON	OFF	ON
\$230 - \$23F	ON	OFF	OFF
\$240 - \$24F	OFF	ON	ON
\$250 - \$25F	OFF	ON	OFF
\$260 - \$26F	OFF	OFF	ON

Installing the Thunder Board



Thunder Master sound card, with switch block and jumpers

Selecting an Audio Interrupt

The Thunder Board sound card requires an audio interrupt to communicate with your PC system board. You select an audio interrupt for the Thunder Board sound card audio circuitry using the jumper block labeled J1. You can select interrupt IRQ2, 3, 5, or 7. The default setting is IRQ7. Locate jumper block J1 in the illustration on the previous page.

Caution! You must choose an interrupt that no other device in your PC is using. There are several possible interrupt conflicts. Interrupt assignments vary, but the table below shows the most common ones:

Interrupt	XT Computer or Compatible	AT Computer or Compatible
IRQ2	Available	Available
IRQ3	COM2: 2nd serial port	COM2: 2nd serial port
IRQ5	Hard disk controller	Available
IRQ7	Available, LPT1: (PRN:) 1st parallel printer port, but usually can be shared. Check for conflicts with other devices.	Available, LPT1: (PRN:) 1st parallel printer port, but usually can be shared. Check for conflicts with other devices.

Note: The Tandy 1000 computers use IRQ7 internally, so you cannot use IRQ7 on your Thunder Board sound card. Use IRQ2 or IRQ5 instead.

Regarding DMA

DMA or Direct Memory Access is used for the playback of digitized sound. The Thunder Board sound card is permanently set to DMA channel 1 in order to maintain compatibility with other sound cards. If the playback of digitized sound is not functioning, please ensure no other hardware devices in your system use DMA channel 1 at the same time.

Using the Joystick Port

The joystick port on the Thunder Board sound card is identical to that of the standard PC Game Control Adaptor (or Game I/O port). It uses an analog joystick with a 15-pin D-Sub connector, and supports any software that uses the standard PC joystick. The joystick port address occupies 200h thru 207h.

If you have a Game I/O port on your PC, you must disable whichever port (Game I/O or Thunder Board) you do not intend to use. To disable the Thunder Board sound card joystick port, turn the JOY switch on the SW1 switch block to the OFF position. Locate the SW1 switch block in the illustration on the previous page. To disable the Game I/O port on your PC, see your Game Control Adaptor documentation.

Installing the Board

You can install the Thunder Board sound card in any full or half length slot of an IBM XT/AT or compatible with an Industry Standard architecture (ISA) bus. Before installing the board, make sure you have followed the instructions in the previous sections on setting jumpers.

The steps provided here demonstrate how to install the Thunder Board sound card in a typical system. Your system may be slightly different.

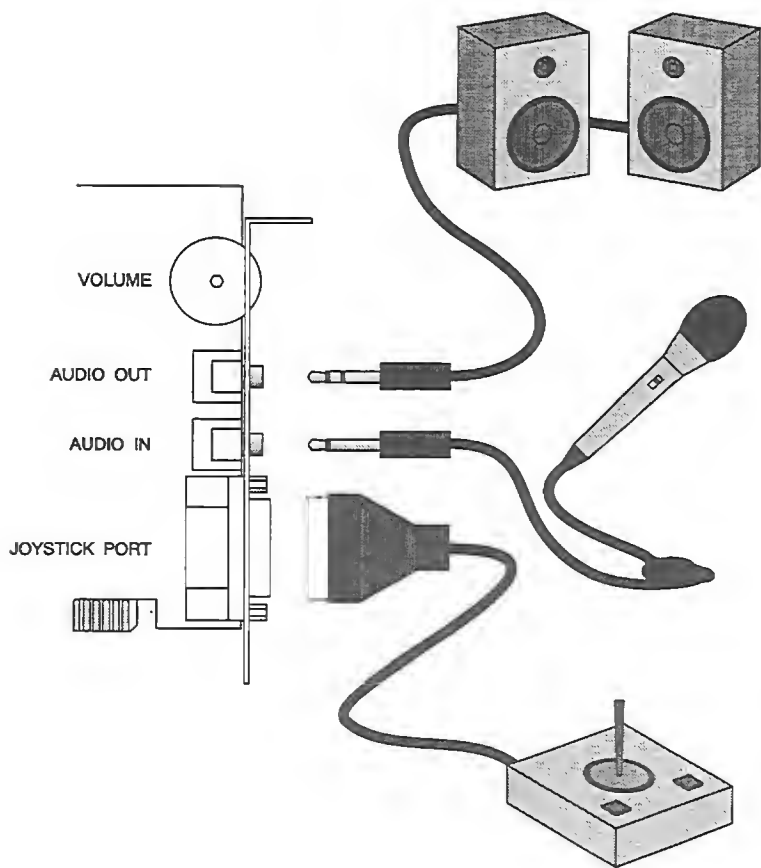
Caution! Your computer must be turned off before beginning the board installation procedure.

To install the Thunder Board sound card:

1. Turn off your PC, but leave the power cable connected to the wall outlet to ensure that your computer is grounded.
2. Remove the screws from the back of the system unit cover.
3. Slowly pull the cover forward and remove it from the system unit.
4. Locate an available (unused) expansion slot. Any full or half length slot can be used.
5. Remove the slot cover. Save the screws to anchor the Thunder Board sound card mounting bracket later.

6. Pick up the board (still in its sleeve) by grasping the edge bracket with one hand. Avoid pressing on board components. With your other hand, touch an unpainted metal surface to discharge any built-up static electricity in your body.
7. Remove the plastic sleeve.
8. With your free hand, touch an unpainted metal surface a second time to ensure there is no static buildup.
9. Insert the board into the expansion slot. Press it firmly to ensure that the board is fully seated. Anchor the board mounting bracket using the screws you set aside in step 5.
10. Replace the cover on the system unit.
11. Connect your external devices to the Thunder Board sound card, as shown in the illustration on the next page.

Installing the Thunder Board



Connecting external devices

Installing the Thunder Master Software

To install the Thunder Master software, simply copy the contents of either sized installation diskette to any directory on your hard disk. The installation diskette includes Thunder Master and other utility programs that you may find useful.

To install the Thunder Master software:

1. While at the DOS prompt use the `mkdir` command to create a directory for the Thunder Master software. For example, you would type `mkdir thunder` to create a directory named THUNDER under your current directory.
2. Change to the new directory using the `cd` command.
3. Insert either sized installation diskette, and type the command `copy a:*.*` (or `copy b:*.*`) to copy all of the files on the installation diskette to your newly created Thunder Master directory.

Verifying the Board Installation

To ensure that your Thunder Board sound card has been installed properly, you should run the program TBTEST, which was installed in your Thunder Master directory when you copied the contents of the installation diskette. If the program encounters any problems with the board, an error message will be displayed.

To run the TBTEST program, change to your Thunder Master directory, and type TBTEST at the DOS prompt.

If the board has been installed correctly and is functioning properly, you will hear the sound of rolling thunder. Your Thunder Board sound card is now fully operational.

Note: For a complete description of the TBTEST diagnostics, as well as suggestions for correcting any problems that may occur, refer to the file WHATSUP.DOC, which was also installed in your Thunder Master directory. This document is in ASCII format and can be read by virtually all word processors and text editors. You can also use the DOS `print` command to print the document, or the DOS `type` command to display the contents of the document on the screen.

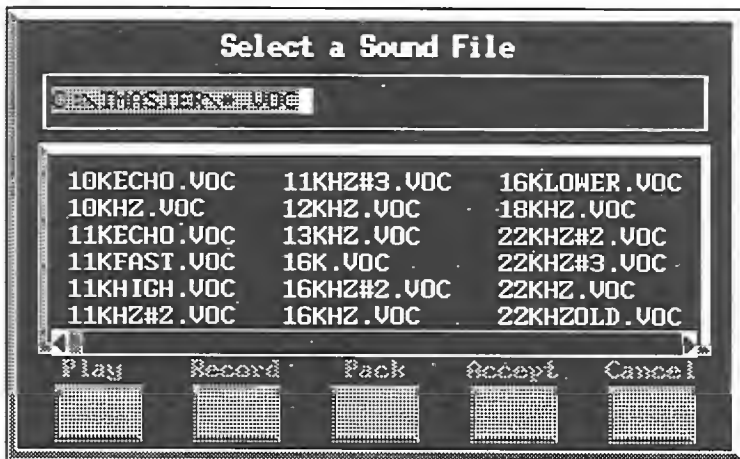
2. Using Thunder Master

This chapter describes using the Thunder Master software. Thunder Master is a program that lets you record and edit sound files using your new Thunder Board sound card. You can use it to record and play back sound files of virtually any length, and with its built-in Sound Editor, you can modify and enhance the recordings you make. You can edit sound files that are up to 30 seconds in length.

Starting Thunder Master

To start Thunder Master, change to the directory containing the Thunder Master software, and type **TMASTER** at the command prompt. If you specify a sound file (one with a **.voc** extension) with the **TMASTER** command, the application will display the file in the Sound Editor. Using the Sound Editor is described later in this chapter.

If you do not specify a sound file when starting Thunder Master, the Select File dialog box appears:



File Select dialog box

The current path can be changed by entering a new path, like `c:\tm\sound*.voc`, in the top input box. Specifying `*.voc` will select all files with a `.voc` extension.

To select a sound file, click the filename in the scroll list. You can see additional sound files in the scroll list by dragging the slider left or right with the mouse, or by clicking the left and right arrows at the end of the slider bar.

Using the File Select Functions

You can perform the following functions with the File Select dialog box:

- Play a sound file
- Record a new sound file
- Pack or unpack a sound file
- Accept a file to process
- Cancel the program and return to DOS

To perform a function on the selected sound file, simply click the appropriate button. (You can also select a function by pressing the **Tab** or **Shift-Tab** keys to scroll through the functions, and then pressing **Enter**.)

Play

Play lets you to listen to a sound file of any length. During playback, the Playback dialog box shows the characteristics of the recording, including the sampling rate used for recording, its length (in seconds), and its size (in bytes).

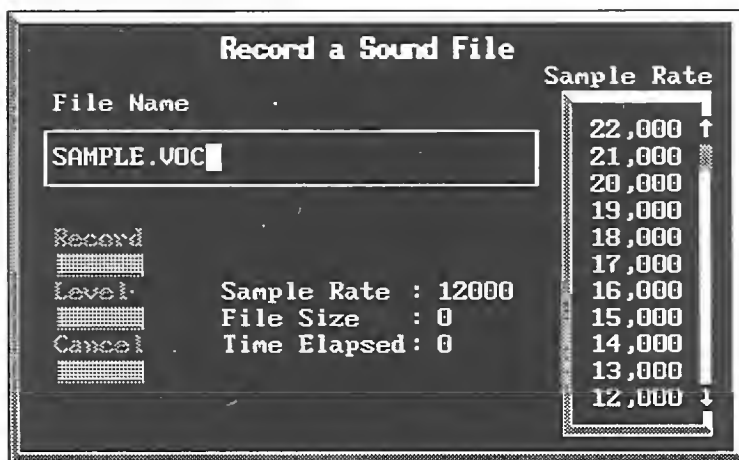


Playback dialog box

Playback can be ended by pressing the **Esc** key or clicking the mouse while the sound file is playing.

Record

Record lets you create a new sound file. When you select Record, the Record dialog box asks you for a filename for the sound file you are going to create.



Record dialog box

Type the name of the sound file you wish to record.

Note: If you specify a sound file that already exists, it will be overwritten.

After selecting a filename for your sound file, select a sample rate for the recording. Thunder Master lets you choose sampling rates in increments of 1 KHz, from 4 KHz to 22 KHz.

Keep in mind that, although higher sampling rates almost always yield better sound, the amount of storage space required for the digitized audio increases as well. You will need to balance the need for a higher quality recording against the number and length of the recording you plan to make.

Thunder Master places no restrictions on the length of the file that can be recorded, so you can make recordings many minutes in length if space is available on your hard disk.

The following table illustrates storage requirements for commonly used sampling rates:

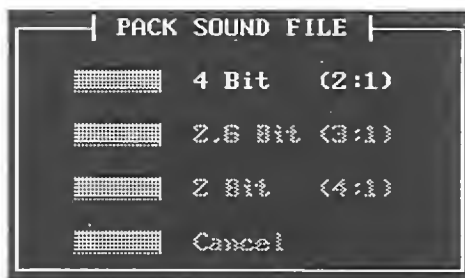
Sampling Rate	Recording Length	Storage Required
8 KHz	10 seconds	80,000 bytes
11 KHz	10 seconds	110,000 bytes
22 KHz	10 seconds	220,000 bytes
8 KHz	30 seconds	240,000 bytes
11 KHz	30 seconds	330,000 bytes
22 KHz	30 seconds	660,000 bytes
8 KHz	60 seconds	480,000 bytes
11 KHz	60 seconds	660,000 bytes
22 KHz	60 seconds	1,320,000 bytes

The Record dialog box also contains a Level selection button. When you choose Level, a graph is displayed that lets you set the volume of the device from which you are recording.

When you are ready to begin recording, click the Record button. Press the Esc key at any time to stop recording. When you finish recording the sound file, it will be displayed in the Sound Editor for modifying. Using the Sound Editor is described later in this chapter.

Pack

Pack lets you compress your recorded sounds and save storage space on your hard disk. When you select Pack, the Pack dialog box appears:



Pack dialog box

Pack supports 2:1, 3:1, and 4:1 compression. For example, with 2:1 compression, Pack will save every two bytes of data in your original recording as one byte. You can play back a packed sound file without having to unpack it.

Note: There can be a loss of sound quality when you use higher compression ratios like 3:1 or 4:1. Make sure you select the proper ratio before compressing your sound files.

If you select a file that is already packed, the Pack function acts as an Unpack. When you click Pack, you will be asked to confirm that you want to unpack the file. Note that if you want to change the compression ratio of a packed file, you must first unpack the file, and then pack it again using the new ratio.

Accept

Accept displays the Sound Editor, where you will see the selected sound file displayed as a waveform. With the Sound Editor, you can enhance or modify the sounds that you have recorded. Using the Sound Editor is described later in this chapter.

Note: The version of Thunder Master that comes with the Thunder Board sound card lets you edit sound files that are no more than 30 seconds long. To edit longer sound files, you must purchase an upgrade to the unrestricted version of Thunder Master. For details about ordering the unrestricted version, see the file called WHATSUP.DOC on the installation diskette.

Cancel

Cancel exits the Thunder Master program and returns the system to DOS.

Using the Sound Editor

When you choose Accept from at the File Select dialog box, the Sound Editor is displayed. In the Sound Editor, the entire sound file is displayed graphically against a grid that divides the sample into seconds. The grid helps you select a sound segment while editing the sound file. (Editing a sound segment is described later in this chapter.) When the Sound Editor is displayed, function keys **F1** through **F5** control the colors of the screen display.

The Sound Editor displays useful file information in the lower left-hand corner of the window, as shown below.

Editing File	The name of the sound file being edited. Information includes the volume, pathname, and filename.
Size of File	The size of the sound sample (in bytes).
Sample Rate	The current sample rate of the sound file. This number may differ from the originally recorded sample rate if you used the Rate function to alter it.
Playing Time	The total length of the sound file, and the current position of the mouse cursor within the waveform display. Figures are displayed in seconds and hundredths of seconds.

The Sound Editor functions appear at the bottom of the display. The initial Sound Editor functions are as follows:

- Play
- Scope
- Echo
- Reverse
- Insert
- More
- New
- Exit

The first time you select a Sound Editor function, a new, untitled sound file is created. Subsequent changes are made to the new file, so the original sound file is not altered. When you exit the Sound Editor, or create a new sound file, you will be asked to name the current, untitled file.

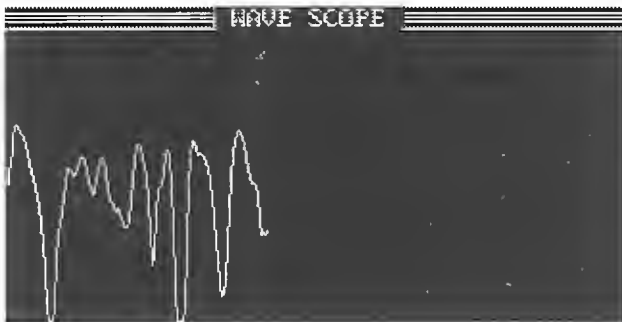
Select an option by clicking the appropriate button, or by pressing **Alt** and the first letter of the option; for example, **Alt-p** will select Play, and the currently selected sound file will play back.

Play

Play performs the same function as the Play button in the File Select dialog box. When you play a sound file in the Sound Editor, a pulsing line indicates the current play position.

Scope

Scope displays sample waveform audio input in real-time.



Scope display

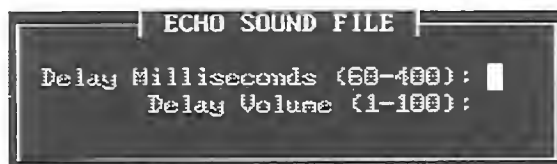
After choosing Scope, you can play music from the audio device you have connected to your Thunder Board sound card or speak into a microphone attached to the Thunder Board sound card to see what the sound waves you are going to record look like. Scope works particularly well on faster machines.

To quit the Scope display and return to the Sound Editor, press any key.

Echo

Echo adds a delay effect to your sound file to give it a fuller, richer sound. Echo can also be used to create interesting special effects.

When you choose Echo, the Echo dialog box asks you to enter two values, as shown below:



Echo dialog box

The first value specifies the amount of delay before the echo starts. The delay is entered in milliseconds, with an allowable range of values from 60 to 400 milliseconds; values outside this range will be ignored. As a rule of thumb, delays of 60 to 100 milliseconds create a sound similar to what you would hear in a large room, while delays of 200 milliseconds create a sound like you would hear in a cavern or canyon.

The second value specifies the volume of the echo that is mixed with the original sound. The allowable range is from 0% to 100%. In general, using a volume of 30% to 60% creates a more realistic sound than a higher value of 90%-100%.

Reverse

The Reverse function reverses the playback of a sound file, as if you were playing a tape backwards. By experimenting with sound files that you record, you will find many sounds that are the same played either forward or backward.

Insert

The Insert function inserts another sound file into the sound file currently being edited.

Selecting Insert displays the File Select dialog box. You can now select a sound file, record a new sound file, or cancel the insert process and return to the Sound Editor.

Once you have selected a sound file by pressing Accept, use the mouse to select the point in the original file where you want to insert the new sound. If the new sound you have selected does not

Using Thunder Master

have the same sample rate as the original, the sample rate of the new file is adjusted to blend in correctly with the original.

Note: You should not select a new sound file that is packed, contains silence compression, or is a multi-block file; otherwise, you will not be able to use the resulting sound file.

More

More displays a second set of Sound Editor functions. These functions are described in the next section, "Using Additional Sound Editor Functions."

New

New displays the File Select dialog box so you can select a new sound file to edit. When you select a new file, the file you are currently editing is closed, and all modifications you made to it are saved.

Exit

Exit quits the Thunder Master program and returns the system to DOS.

Using Additional Sound Editor Functions

When you select More from the Sound Editor menu, additional editing functions become available. The additional Sound Editor functions are:

- Fast
- Slow
- Rate
- Volume
- Mixer
- More
- New
- Pack or UnPack

Fast

Fast lets you re-sample a sound file without altering the pitch. Without the Fast function, if a sound file originally sampled at 8KHz is played back at 16KHz, not only is the pitch increased, but the sound will play back in half the time. With the Fast function, you can modify the time domain without affecting the frequency domain. Put another way, you can re-sample a sound file that will play back at approximately twice the speed without affecting the pitch. Fast decreases the size of the sound file by approximately one-half.

Use the Fast slider to select the desired speed increase.

Slow

Slow works just like Fast, except that it doubles the amount of time it takes to play a sound file. The size of the sound file is also doubled.

Rate

Rate lets you lower the sample rate of a sound file that was created with a high sample rate.



Rate dialog box

Due to CPU processor speed and overall system performance, some personal computers have difficulties playing sound files with high sample rates. The Rate function lets you change the sample rate of your sound file to something more compatible with your personal computer. It is also a good way to make files smaller without the degradation typically associated with compression. For example, a sound file recorded at 12 KHz and then down-sampled to 8 KHz will usually sound better than if it had been originally recorded at the slower rate. Sound files originally sampled on the Macintosh at 22 KHz can be down-sampled to 12 KHz or less with almost no loss of clarity.

Rate is also capable of up-sampling, i.e., converting a sound file recorded at 8 KHz to 16 KHz. However, there will be no gain in resolution since approximating audio data that was not originally

recorded is unpredictable. You should not rely on the quality to be as good as an original recording at the higher sampling rate.

Volume

Volume increases or decreases the volume of a sound file. It can be particularly useful in creating clean recordings from a compact disk or tape by reducing the volume on the audio playback device connected to the Thunder Board sound card during recording.

After sampling is complete, you can use the Rate function to re-sample the file at a higher volume and avoid the distortion that is typically introduced by recording at higher volumes.

When you select Volume from the Edit Menu, the Volume dialog box is displayed:



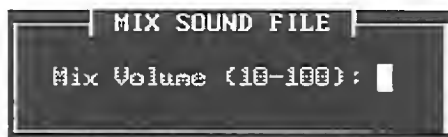
Volume dialog box

Type an **I** to increase the volume or **D** to decrease the volume. Then enter a numeric value to determine the amount of change in the resulting file. When increasing the volume, values in the range of 10 to 50 will have a subtle effect on the sound file; whereas values of 50 to 200 or more will have a more dramatic effect. When decreasing the volume, values of 1 to 99 will cause the file to have volume of approximately the percent of the number entered. Entering 50 will produce a sound file that is only 50% as loud as the original.

Note: If you enter a value greater than 100, the effect will be to increase the volume, even if decrease was selected.

Mixer

Mix blends two sound files into a single file. When you select Mix, a File Select dialog box asks you to enter the name of the sound file you want to mix with the sound file currently being edited. After you have selected a file, the Mix dialog box appears:



Mix dialog box

Enter a mix volume parameter in the Mix dialog box. The mix volume parameter determines the volume of the new sound file relative to the original file. You can enter a value between 1 and 100. In general, a value of 50 to 60 is a good setting for mixing. The Mixer is a great way to add special effects to your sound files.

Note: This function adjusts the sample rate of the sound file with the lower rate.

More

More displays the original set of Sound Editor functions.

New

New causes the File Select dialog box to appear, so you can select a new sound file to edit. When you select a new file, the file you are currently editing is closed, and all modifications you made to it are saved.

Pack or Unpack

If you are editing an unpacked sound file, Pack lets you compress your recorded sounds and save storage space on your hard disk. If you are editing a packed sound file, this function will act as an UnPack. The Sound Editor Pack and UnPack functions work the same as the Pack function in the File Edit dialog box, described earlier in this chapter.

Editing a Sound Segment

The Sound Editor lets you edit just a portion of a sound file. When you select a sound segment, the following functions become available:

- Play
- Cut
- Zoom
- UnZoom
- Mute
- Save
- Exit

To select a sound segment:

1. In the waveform area of the sound file, click where you want the top-left corner of the selected segment to be positioned. A dialog box appears asking you to specify a second position within the sound file.
2. Click a second time where you want the bottom-right corner of the segment to be positioned. The selected segment is enclosed in a rectangular box.

Thunder Master uses a zero-crossing/phase approximation method to select the bytes that are displayed. This selection method allows the cleanest points to be chosen for processing, and it allows cross-fading or blending to be applied to splice points.

Play

Play lets you to play back the currently selected sound segment. It works the same as the previously described Play functions.

Cut

Cut removes the currently selected segment of your sound file. The cut segment is permanently removed from the file; cut operations cannot be undone.

Zoom

Zoom enlarges the selected segment and displays it across the entire screen, so you can edit sound files with precision. You can select a new segment from the zoomed area and repeat the process until the

resolution reaches 1:1 (one byte of sampled data corresponds to one vertical sample line on the screen).

For reference purposes, the current resolution is displayed just above the options selection box.

Note: The Sound Editor works on all single block compressed data, with the exception of silence encoding. Thus, while the graphic representation of the sound data will not be completely accurate, the time display should be extremely close.

UnZoom

UnZoom reverses the zoom process. It causes the sound file to be displayed at its original size.

Mute

Mute causes the selected segment to be replaced with silence.

Save

The Save function saves the currently selected segment in a new file. A File Select dialog box is displayed, and you are asked to enter the filename of the new sound file. After the file is saved, you can edit the old file or the newly created file.

Exit

Exit quits the Thunder Master program and returns the system to DOS.

Appendix A, Connecting to the Pro AudioSpectrum

By connecting the Thunder Board sound card to the Media Vision Pro AudioSpectrum sound card, you can have the advanced features of the Pro AudioSpectrum while still maintaining SoundBlaster compatibility. Connecting these two cards also allows you to control the volume of the Thunder Board sound files using the Pro AudioSpectrum keyboard volume commands while using one pair of speakers attached to the Pro AudioSpectrum.

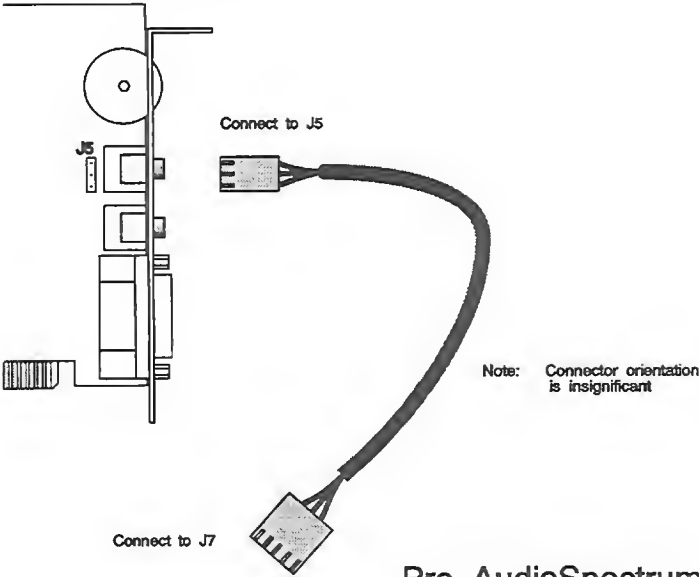
You connect the two boards using the internal audio output connector on the Thunder Board sound card and the internal audio input connector on the Pro AudioSpectrum sound card. To ensure that no conflicts exist between the two boards, the IRQ and DMA settings must be different on each. In addition, the Joy and FM switches on the Thunder Board SW1 block must be set to the OFF position.

The audio connection from the Thunder Board sound card to the Pro AudioSpectrum sound card is shown in the table below. Find the internal audio output connector in the illustration on the next page.

Thunder Board Pin	Pro AudioSpectrum Pin
1 (mono audio)	2 (right audio signal)
2 (signal ground)	3 (signal ground)
3 (same as pin 1)	4 (left audio signal)

Note: The internal audio input connector on the Pro AudioSpectrum sound card is also used to connect it to an internally mounted CD-ROM or a Media Vision SCSI bracket adapter board. An alternative is to connect the Thunder Board line out jack to the Pro AudioSpectrum line in.

Thunder Board



Internal audio output connector